Geophysical Research Abstracts
Vol. 20, EGU2018-16635, 2018
EGU General Assembly 2018

Widespread seasonal compensation effects of spring warming on plant productivity in northern ecosystems

Wolfgang Buermann (1), Matthias Forkel (2), and Andrew Richardson (3)

(1) University of Leeds, Institute for Climate and Atmospheric Science, School of Earth and Environment, Leeds, United Kingdom (w.buermann@leeds.ac.uk), (2) Climate and Environmental Remote Sensing Group, Department for Geodesy and Geoinformation, TU Wien, 1040 Vienna, Austria (matthias.forkel@geo.tuwien.ac.at), (3) Northern Arizona University, School of Informatics, Computing and Cyber Systems, Flagstaff AZ 86011 USA (Andrew.Richardson@nau.edu)

Multiple lines of evidence point to a strong influence of a changing climate on plant phenological cycles, which in turn may alter the climate through their influence on important biophysical processes and biogeochemical cycles. In northern ecosystems, warmer springs lead generally to an earlier onset of the growing season and increased plant productivity early in the season but how these changes influence plant productivity later in the growing season through lagged effects is not well understood. Here we examined the impact of warmer springs on plant productivity throughout the growing season across northern ecosystems exploiting long-term satellite observations and current generation carbon cycle models. Our results provide first evidence for widespread contrasting lagged phenological responses of plant productivity whereby areal extent of positive (26%) and negative (20%) lagged effects are roughly similar across northern ecosystems. Carbon cycle models show much higher areal proportions of positive lagged (29-78%) effects on plant productivity and significantly less negative lagged (3-13%) effects. This suggests that coupled climate-carbon cycle models may substantially overestimate plant carbon uptake associated with warmer springs and linked plant phenological shifts.